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# **A Holistic Approach to Interdisciplinary Innovation Supported by a Simple Tool**

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**Abstract** Innovation is recognised as a strategy to achieve competitive businesses and products. Managing innovation at all levels requires integration of knowledge and interdisciplinary cooperation. Different understandings and approaches to innovation between professions often result in communication problems. To overcome this barrier a common ground is needed. This paper describes a holistic approach to innovation and presents a simple tool for facilitating cooperation on a diversity of innovation matters. It describes the development and use of the tool and demonstrates its capacity to support interdisciplinary innovation in diverse groups. The results build on a sustained and emergent research process.

**Keywords** innovation, holistic, interdisciplinary, cooperation

## **1. Introduction**

Innovation is recognised as an important strategic means in achieving competitive business and products in a global market. As requirements and knowledge increases innovation becomes a complex matter (Burnett, 1997) which need involvement of more profession. Cultural diversities between professions as well as different interpretations of innovation create an unstable basis for cooperation resulting in communication problems (Stokholm, 2005), loss of valuable information and waste of time.

Innovation is many things. In this case I will look at it as a cross disciplinary process. Managing innovation is about decision making (Mintzberg, 2004) based on negotiation and uses among others the principle of interaction between diversities. Innovating is different from traditional ways of planning being a dynamic creative process on a somewhat unsafe ground. Traditional organizations do not encourage knowledge sharing and cross-disciplinary cooperation. Managing cooperation on all levels of innovation requires a firm ground, confidence with the principles of innovation and practical tools. This paper deals with the development and use of a simple model, aimed at providing a platform for interdisciplinary innovation, secure an efficient innovation process and a qualified result. It will try to answer the following questions:

- Is it possible to create a common ground for interdisciplinary design and innovation?
- Can the use of a simple tool qualify communication and cooperation on and in innovation?
- Is it possible to create a simple tool, which embraces the complexity of innovation and can be used by a diversity of professions?

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## 2. Methods

### 2.1 Overall method

The overall method can be characterized as occasion driven action research organized as a continual interplay of creation, action and reflexion involving the creator and a diversity of users. The research has been carried out in chains of model developments, presentations to different audiences, applications on a diversity of tasks, reflexions and further model development.

### 2.2 Model development

The model has emerged over period of several years. From a simple structure the model has included more parameters, aspects and functions offering more use options but still remaining simplicity. The progression resulted in a transformation from a concept of design to a holistic system for innovation. Three versions of the model along the research process stood out by proving their ability to work out for a diversity of users who also named them.

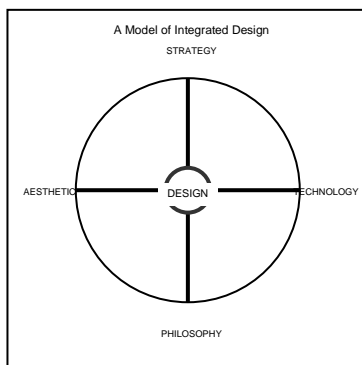


Figure 1: Version one

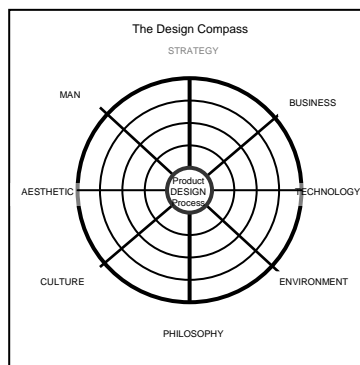


Figure 2: Version two

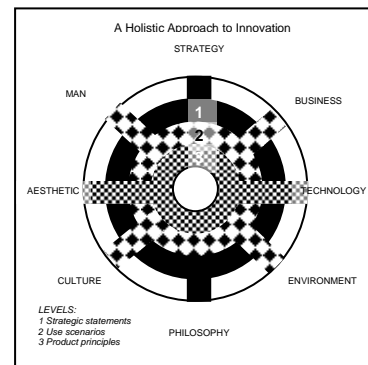


Figure 3: Version three

Version one named A Model of Integrated Design developed by the author in 1998 (Figure 1) was inspired by a definition of the man-made (Aristotle's, 400 bc) and represented design as a cross field of object and human aim; -defining the object as integration of form and matter and the human influence as integration of source and purpose. Aristotle's parameter terms were translated to: Aesthetic & Technology and Philosophy & Strategy.

Version two named The Design Compass or The Innovation Compass developed by the author in 2002 (Figure 2) (Stokholm, 2004, 2005, 2006) represented a progression of the first version. Four use contexts in a broad perspective were added to object and aim including the parameters; -Man & Environment and Business & Culture. Furthermore, a wider understanding of design as both product and process was introduced.

Version three named A Holistic Approach to Innovation developed by the author in 2007 (Figure 3) represented a further integration of object and process. Inspired by Lerdahl the innovation process was organized in “Levels of approaches between abstraction and concretization” (Lerdahl, 2001) providing a structure of creation modes. See Figure 7 for further elaboration on this. To frame the process between parameters and object three levels with reference to the innovation approaches was introduced: -Strategic Statements, Use Scenarios & Product Principles. Each level was linked up with the according parameters thus establishing a holistic and integrated structure for innovation.

### *2.3 Testing models in use*

The three versions have been presented in various ways and used at a diversity of occasions involving students, researchers and professionals.

Version one was presented as a simple drawing to interdisciplinary groups working on establishing new educations and a research centre on integrated design. A number of individuals occasionally came across the model. The model was used to support communication and cooperation, which was disrupted due to different interpretations of design.

Version two was presented as a power point presentation including examples of use at interdisciplinary courses for students and professionals within design, engineering and management. The model was used by design-engineering students, product development managers and interdisciplinary teams to map positions and relations concerning different matters of design and innovation, as well as to analyze existing solutions and suggest new solutions.

Version three was introduced as a one day course to 24 engineers with different specialization in an international company. The course format was a mix of instructions and project work in interdisciplinary groups of 4, with a progression in both complexity and sophistication of tasks. The model was used to extend their approach to innovation from a mono cultural technology approach to a holistic approach and to turn focus from hardware to user experience design.

## **3. Results**

To illustrate the emergent nature of the research and present the evolutionary development of the tool and the progression in experience and knowledge gained through use, this chapter is structured according to the three versions and the fulfilment of their aims.

The overall aim of A Model of Integrated Design was to create interdisciplinary agreement on the concept of design why the findings will focus on the immediate reactions and acceptance of the model as well as qualification of the interdisciplinary communication (Stokholm, 2005). The first reaction in all cases was not only full acceptance but immediate adoption and naming. A few questioned the need of defining design expecting all to have the same understanding. The presented model created a common reference, gathered the participants on a common goal and transformed the former disconnected discussions to a more constructive communication.

The group leaders used the model on the spot to suggest formulation of the mission for the actual tasks. Individuals, who came across the model immediately picked up the model and used it as a matrix to explain and map issues of personal interest within design to others.

The aim of The Design Compass was to create interdisciplinary agreement on the approach to design and innovation why the findings will focus on tasks for which the compass was used and the calibration of optics as well as interdisciplinary consensus. The compass was used to map positions including among others: competences and profiles (Figure 4) (Stokholm, 2005), design tasks (Figure 5) (Stokholm, 2005), design research and design methods. It provided a field for mapping of relations including among others; product design, strategic design, money making-meaning making (Figure 6) (Nilsson, 2005) and product concept-product use-product AD (Stokholm, 2004).

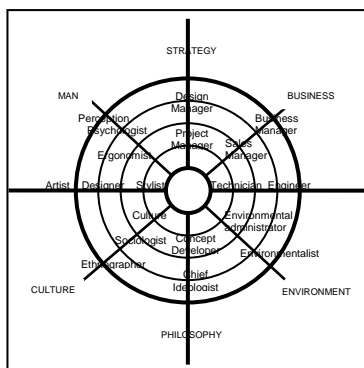


Figure 4: Competences

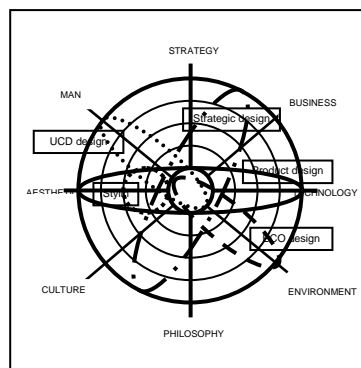


Figure 5: Design tasks

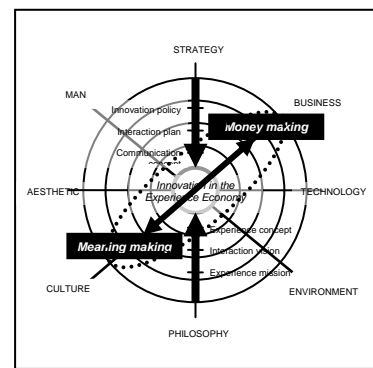


Figure 6: Innovation issue

The compass worked well for all mapping tasks. The compass was further used by two companies for descriptions of the company and a product line which was then subsequent analysed by an interdisciplinary group looking for problems and potentials as basis for suggestions of new solutions.

The diversity of professions found it easy to use to the compass and its optic on design after a short introduction. Even though some hard core engineers resisted coming out of their profession silo they did not in general question the integrated and process focused approach to design. The business approach seemed to be more in line with the design approach. In most cases consensus on the model was reached shortly after the presentation. Many welcomed the model which they expressed to have missed without knowing it until now. Interdisciplinary groups who had never worked together before went ahead with negotiation and project matters in an optimistic and inspired way.

The aim of A Holistic approach to Innovation was to create interdisciplinary agreement on a tool for innovation why the findings will focus on the tools use capacity (Heskett, 1998) and the user ability to handle and share the tool as well the adaptation of the holistic approach. The use included progressive approaches to innovation (Figure 7).

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The users became acquainted with the structure and approach levels and principles quite easily during the course expressed by the users as “It is so much easier to articulate creativity, when you have a common frame”. The tool proved its utility for simple product analysis as well as complex experience innovation supplemented by “Could eventually be tailored to specific departments using other headlines”. It was accepted as sign of innovation and as such proved its symbolic capacity expressed as “Good to have a structure of the creative process”. The tools ability to handle a diversity of tasks demonstrated its systemic use capacity supported by expressions as “Good to have an overview, because we usually only talks about technique at the beginning”, “Would be exiting to view a whole organisation using the tool” and “Can be used as a universal tool”.

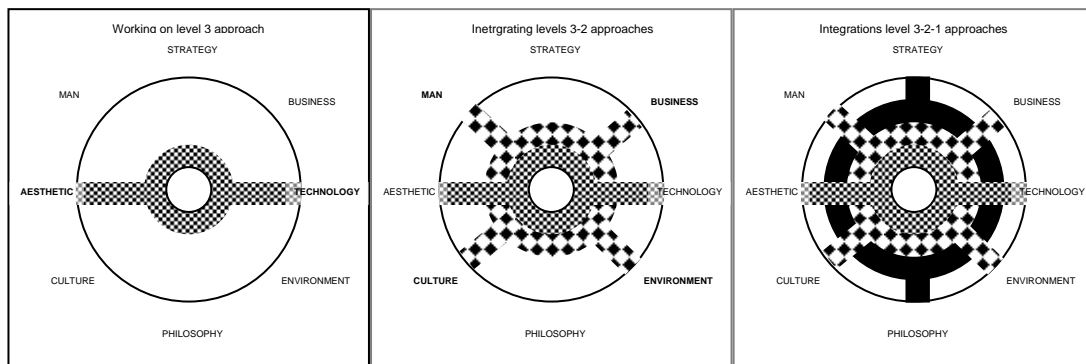


Figure 7: Progression in approaches to innovation

During the course the users reached a high level of handling and scaring the tool. Weather this will count when they are on their own after the course still needs to be investigated. They might need a brush up course or further coaching.

## 4. Discussion and conclusion

### 4.1 Research methods

The overall research project is emergent. It grew out of practice experience on interdisciplinary communication problems and a vision of a design tool for common use; -a tool which embraces the complexity of design, can be used for a multiplicity of tasks and still is very simple and easy to understand.

At occasions of interdisciplinary discussion and cooperation on design matters drafts were introduced. The surviving drafts were tested in practical use and the experience gained became the basis for further development.

This research method of action and reflexion is quite similar to the design process and at a certain stage of the project version 2 was tested on itself and proved its consistency. The research methods evolutionary nature due to practical circumstances has proved to be very useful.

#### 4.2 Research matters

Is it possible to create a common ground for interdisciplinary design and innovation?

It has been proved that a common ground for design and innovation support interdisciplinary cooperation. To “Go for the ball instead of the man” requires that both the ball and the game field are visible. A visualized common ground can clarify the field and calibrate the approach. Through this it joins the forces and turn focus to the shared task.

The holistic representation of design was accepted by a diversity of professions, even though some needed more time than others. One reason for acceptance is probably that people at first hand recognized their own profession in the models and subsequent its relation to other professions. Experiencing “Oh, yes I am there” and “Aha I am part of a team”.

Can the use of a simple tool qualify communication and cooperation on and in innovation?

Communication is about exchange of experience, knowledge and ideas which imply the risk of turning into monologs demonstrating and defending professional positions. That is why clarifying both the positions and the interaction field to the actors create confidence and support constructive interaction and exchange. Once the actor positions, the common field and the confidence are established the game is set.

Activating the game of interdisciplinary cooperation further requires a set of rules. The graphic structures on the different versions provide a visual set of rules which is enough to cooperate on mapping. Cooperation on innovation is about decision making. Managing decision making with an analytical approach can be done using the patterns alone on version 2 and 3. To manage decision making with a creative approach a set of movement principles is required. Such principles were introduced at the one day course. The innovation process is about interaction between analytical (systematic) and creative (chaotic) approaches and need some instruction, coaching and facilitating to handle at the beginning. While the first version was understood immediately, the second needed demonstration and the third version a set of instructions and user tests.

The holistic approach, the nature of innovation and the principles of interactions though was absorbed extremely fast in all occasions and the participants were able to manage tasks from product to experience innovation. The actual instructions might further on be limited in time to leave more time for project work at a course.

Is it possible to create a simple tool, which embraces the complexity of innovation and can be used by a diversity of professions?

The model versions represent a development in complexity and use options for which reason each of them can be used separately. The last version still provide a simple and easy understood structure but compared to the first version it now frames a diversity of complex activities and a multiplicity of tasks within innovation.

As innovation and the approach to it can be understood as a system the tool box must contain a description of elements, structure and principles. The capacity of the tool seems to be in line with “Product use capacity required in the New Economy including utensil capacity, symbolic capacity and systemic capacity.” (Heskett, 1998).

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